

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Patent Application No. 10/775,889

Confirmation No. 1284

Applicant: Schauer et al.

Filed: February 9, 2004

TC/AU: 1762

Examiner: Turocy, David P.

Docket No.: 226465 (Client Reference No. A 100 630g)

Customer No.: 23460

APPELLANTS' APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In support of the appeal from the final rejection dated January 18, 2008, Appellants now submit their Brief.

Real Party In Interest

The patent application that is the subject of this appeal is assigned to Forschungsinstitut für Pigmente und Lacke E.V., who is the real party in interest.

Related Appeals and Interferences

There are no appeals or interferences that are related to this appeal.

Status of Claims

The status of the claims is set forth in the Appendix attached hereto. Claims 1-12 and 14-20 are currently pending and are the subject of this appeal.

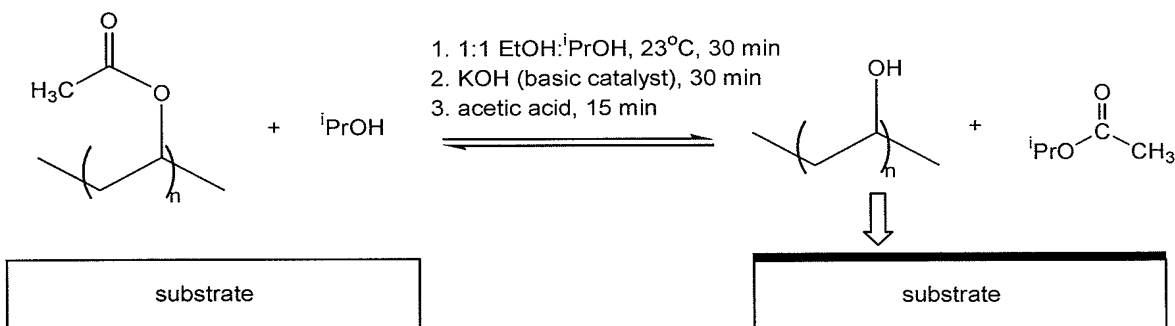
Status of Amendments

No amendment was filed subsequent to final rejection. All previous amendments to the claims have been entered by the Office.

Summary of Claimed Subject Matter

The appealed claims are directed to a process for coating a substrate with a polymer. The process relies on a kinetically-controlled solvolysis reaction to produce a polymer with reduced solubility in the solvent in the presence of the substrate and thereby cause deposition and/or immobilization of the polymer on the surface of the substrate. The deposition thus obtained involves more than just adsorption of the polymer onto the surface and makes it possible to control the thickness of the deposited layer. *See* English specification, p. 2, ll. 25-31. The process of the invention is particularly suitable for the application of very thin polymer layers to a surface of a substrate, which nevertheless can produce dense coverage on the surface of the substrate despite the small layer thickness. *See* English specification, p. 4, ll. 32-35.

An example of the coating process recited in the appealed claims is depicted in the figure below which generally illustrates base-catalyzed alcoholysis of polyvinyl acetate (PVAc) using isopropyl alcohol (solvent), as described in Example 1 (p. 7, l. 1, to p. 8, l. 30). The solvolysis reaction results in conversion of the acetate groups of the PVAc to alcohol groups, and formation of polyvinylalcohol (PVOH), which is insoluble in the reaction solvent and thus precipitates under the kinetic control of the solvolysis reaction from the solution onto the surface of the substrate to form a nanolayer coating.



In particular, appealed claims 1-12 and 14-16 are directed to a method of coating the surface of substrates comprising the steps of: (i) bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents

in a solvent into contact with the surface of the substrate; and (ii) converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a solvolysis reaction and thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the surface of the substrate. *See, e.g.*, independent claim 1, English specification at p. 2, ll. 21-30, and Examples 1 and 2 (p. 7, l. 1, to p. 10, l. 3).

Appealed claim 17 is directed to a method of coating the surface of substrates, comprising the steps of: (i) bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and (ii) converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a kinetically controlled solvolysis reaction and thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the substrate surface. *See, e.g.*, English specification at Example 1, p. 7, l. 11, and Example 2, p. 9, ll. 23-27.

Appealed claims 18-19 are directed to a method of coating the surface of substrates, comprising the steps of: (i) bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and (ii) converting at least a portion of the polymer to a polymer form that is insoluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a kinetically controlled solvolysis reaction and thereby depositing the insoluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the substrate surface. *See, e.g.*, English specification at p. 2, ll. 25-31, p. 5, ll. 1-9, as well as Examples 1-2 (p. 7, l. 1, to p. 10, l. 3).

Appealed claim 20 is directed to a method of coating the surface of substrates, comprising the steps of: (i) bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and (ii) converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a solvolysis reaction and thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the surface of the substrate, wherein the deposition of the less

soluble polymer on the substrate surface yields a coating on the substrate having a controlled thickness. See, e.g., English specification at, p. 2, ll. 28-31, as well as p. 6, ll. 5-6.

Grounds of Rejection To Be Reviewed On Appeal

- Whether claims 1-12 and 14-20 are unpatentable under 35 U.S.C. § 112, first paragraph, as lacking enablement.
- Whether independent claim 1 and claims 3, 4, 5, 7, 8, 10, 12, 14 and 16 dependent thereon are unpatentable under 35 U.S.C. § 102(b) in view of Bugnon (*i.e.*, European Patent 0 528 602).
- Whether independent claim 1 and claims 3, 4, 5, 7, 8, 10, 12, 14 and 16 dependent thereon are unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Noro (*i.e.*, Noro, K., “Hydrolysis of Polyvinyl Acetate to Polyvinyl Alcohol” in *Polyvinyl Alcohol - Properties and Applications*; C.A. Finch; John Wiley and Sons: London, 1973).
- Whether independent claim 17 is unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Noro and Stamicarbon (*i.e.*, NL 7714035A).
- Whether independent claim 18 and claim 19 dependent thereon is unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Noro and Stamicarbon.
- Whether independent claim 20 is unpatentable under 35 U.S.C. § 103(a) in view of Bugnon et al. in combination with Noro and Stamicarbon.
- Whether dependent claim 2 is unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Marie (*i.e.*, Marie, E., et al., “The Controlled Solvolysis of Ethylene-Vinyl Acetate Copolymers”, *Macromolecules*, 2001, 34, 5838-5847), or in combination with Noro and Marie.
- Whether dependent claim 6 is unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Mark (*i.e.*, “Addition Polymerization,” in *Encyclopedia of Polymer Science and Engineering, A to Amorphous Polymers*, Mark, H.F., et al., eds., 1985, vol. 1, New York, pp 470-471), or in combination with Noro and Mark.

- Whether dependent claims 9 and 15 are unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Cox (*i.e.*, U.S. Patent 3,393,162), or in combination with Noro and Cox.
- Whether dependent claims 11 and 13 are unpatentable under 35 U.S.C. § 103(a) in view of Bugnon in combination with Herman (*i.e.*, U.S. Patent 3,884,871) or in combination with Noro and Herman.

Argument

A. Rejection of Claims 1-12 and 14-20 under § 112, first paragraph, as lacking enablement

The Examiner alleges that essential subject matter is missing from the claims and that the appealed claims are accordingly invalid under 35 U.S.C. § 112, first paragraph, as lacking enablement. Specifically, the Examiner alleges that the temperature, concentration and solvent used to carry out the claimed method are critical or essential.

In determining whether an unclaimed feature is critical, the entire disclosure must be considered. Features which are merely preferred are not to be considered critical. *In re Goffe*, 542 F.2d 564, 567 (CCPA 1976). Viewed in light of the entire disclosure, it is clear that the temperature, concentration and solvent used to carry out the method recited in the appealed claims are not critical elements that must be recited in the claims. Indeed, the Examiner has pointed to no portion of the specification which identifies temperature, concentration, and solvent as critical or essential features of the invention.

The method recited in the appealed claims involves converting a polymer to a less soluble polymer form through solvolysis reaction and “thereby depositing” the less soluble polymer form on the surface of a substrate. Thus, the conditions (e.g., temperature, concentration, and solvent) used to carry out the method can be any conditions which result in a coating thereby being deposited on the surface of the substrate as a result of the solvolysis reaction. That different temperature, concentration, and solvent conditions are contemplated by Appellants is reflected by the fact that the specification teaches that a range of solvents, reaction times, and reaction temperatures can be used. *See* English specification at, e.g., p. 2, ll. 33-35; p. 3, ll. 1-3, 8-10, 32. Moreover, the two examples set forth in the specification (examples 1 and 2) involve the use of different conditions including different solvents, different reaction times, and different concentrations. *See* English specification, p. 7, l. 1, to p. 10, l. 3. Thus one of ordinary skill in the art would appreciate after reviewing the

specification that there is no single “critical” set of reaction conditions required to carry out the method of the invention. Rather, the conditions will depend on the type of substrate, the type of polymer coating desired, the thickness of the polymer coating desired, and the like.

In view of the foregoing, Appellants submit that the temperature, concentration, and solvent conditions used to carry out the method recited in the appealed claims are neither critical or essential, and accordingly the rejection under Section 112, first paragraph, is improper.

B. Rejection of Claims 1, 3, 4, 5, 7, 8, 10, 12, 14 and 16 under § 102(b) as anticipated by Bugnon

Bugnon fails to disclose a method of converting a polymer to a less soluble polymer form that deposits onto the surface of a substrate by subjecting the polymer substituent groups to an *in situ* solvolysis reaction, as recited by the appealed claims. Bugnon generally discloses a method for producing a coated pigment with a vinyl polymer (e.g., polyvinylalcohol) by mixing a polymer with an aqueous dispersion of the pigment particles until the pigment particles are coated. Bugnon teaches that “optimum conditions, such as temperature and stirring times, for particular pigments and coating polymers can readily be determined by simple experiment.” Bugnon, p. 3, ll. 6-7.

The only disclosure in Bugnon relating to solvolysis is a single statement that when polyvinyl alcohol is used as the coating polymer, it “may be formed in situ by hydrolysis of a vinyl acetate polymer in a dispersion of the pigment.” Bugnon, p. 2, ll. 37-38 (emphasis added). Hydrolysis is a type of solvolysis reaction in which the solvent used to carry out the reaction is water. Based on the strength of this single statement, the Examiner asserts that Bugnon discloses the same process steps required by the claims, which the Examiner identifies as “(a) bringing a solution of a PVAc in an organic solvent, (b) subjecting the PVAc to a solvolysis reaction to form PVOH, and (c) coating the surface of a substrate.” See Office Action dated January 18, 2008, p. 8, section 6, ll. 8-12. The Examiner’s logic is that because Bugnon allegedly teaches the same process steps required by the appealed claims, Bugnon must also disclose the same “converting polymer A to less soluble polymer B by subjecting the polymer to a solvolysis reaction and thereby depositing polymer B on the surface of a substrate” step recited by the appealed claims.

The Examiner’s argument is flawed because it oversimplifies the process steps recited by the appealed claims and in so doing ignores the language of the appealed claims that requires that deposition occurs as a result of the solvolysis reaction. The appealed claims

recite that the polymer of the solution is converted to a polymer form that is less soluble by a solvolysis reaction “thereby depositing” the less soluble polymer form on the surface of the substrate. In other words, the solvolysis reaction is the direct mechanism and driving force by which the polymer is “thereby” deposited onto the surface.

Bugnon does not disclose deposition of a polymer onto a substrate by means of a solvolysis reaction as is recited in the appealed claims. Rather Bugnon teaches that the conversion of PVAc to PVOH is a hydrolysis reaction, which means that the reaction is carried out in the presence of water. However the reaction product of this hydrolysis reaction (PVOH) is soluble in water. Accordingly, hydrolysis of PVAc to PVOH would not result in the PVOH being deposited on the surface of a substrate as recited by the appealed claims, because the PVOH would continue to be soluble in the aqueous solvent. Thus nothing in Bugnon teaches or suggests that a polyvinyl alcohol formed by hydrolysis of a vinyl acetate polymer would be less soluble than the parent vinyl acetate polymer such that formation of the polyvinyl alcohol polymer resulting in it “thereby” being deposited on the surface of a substrate.

Moreover nothing in Bugnon teaches that the reaction conditions of such a solvolysis reaction could be altered such that the hydrolysis of PVAc to PVOH would result in a polymer form that is less soluble and which is thereby deposited on the surface of a substrate. Bugnon teaches that the coating should be achieved by adsorption or, alternatively, by precipitation induced by addition of a precipitant salt. Bugnon, page 3, lines 8-10. Each of these processes are distinguishable from the method recited in the appealed claims.

The adsorption method disclosed by Bugnon is distinguishable from that recited by the appealed claims because the claim term “thereby depositing” requires more than mere adsorption. Adsorption is a process whereby a material, such as a polymer, adheres on the surface of a substrate as a result of attractive bonding forces between a particular polymer and substrate which cause the two to come together. Adsorption stops when the attractive groups on the surface of the substrate are used up and so the thickness of a coating layer produced by adsorption is limited by the number of attractive sites on the substrate. Adsorption is in contrast to a precipitation process which requires the coating polymer to be placed in a nonsolvent such that it transitions from a dissolved state to a precipitated state. Unlike a coating formed by adsorption, the thickness of a coating formed by precipitation can have any thickness (limited only by the amount of polymer applied) because precipitation does not require bonding sites. Indeed, as described in the specification, a precipitation

process such as that recited in the appealed claims can be repeated numerous times to achieve a coating of the desired thickness. *See* English specification, p. 6, ll. 19-23.

However, precipitation such as that suggested by Bugnon is still different from precipitation induced by a kinetically controlled solvolysis reaction as recited by the appealed claims. When precipitation is induced by addition of a precipitant salt to the solvent, all of the dissolved polymer is precipitated at once causing irregular deposition of the polymer onto the surface of the substrate and flocculation of the remaining undeposited polymer. Such flocculated polymer is an unwanted impurity in the substrate coating process and must be removed in an additional process step adding unnecessary costs. In contrast, precipitation under the kinetic control of the solvolysis reaction allows for a regular deposition of the polymer on the substrate surface in the absence of undesirable flocculation since only a limited portion of the polymer is converted to a less soluble polymer form at a time. Thus, a coating formed under kinetic control of a solvolysis reaction as recited by the appealed claims is more dense and regular.

The method recited in the appealed claims involves converting a polymer to a less soluble polymer form through solvolysis reaction and “thereby depositing” the less soluble polymer form on the surface of a substrate. While it could be argued that the term “depositing” includes the process of adsorption, the instant specification makes clear that deposition in the context of the invention means “more than just adsorption,” see page 2, lines 28-30, and the claims also expressly require that the depositing step involve more than mere adsorption. That “depositing” means more than mere adsorption is further supported by the claimed step of converting a polymer to a form that is “less soluble.” In the context of the appealed claims, the solvolysis reaction which converts a polymer to a form that is less soluble results in deposition of the less soluble polymer form on a surface of a substrate. Accordingly, the appealed claims taken as a whole, make clear that the less soluble polymer form is deposited on the substrate surface in a manner involving more than just adsorption which inherently means that the less soluble polymer is insoluble under the particular reaction conditions. By way of contrast, adsorption does not require that a polymer become insoluble, or even less soluble, because adsorption can occur from a polymer in solution. Thus the mere disclosure of a process involving adsorption cannot anticipate the process recited in the appealed claims reciting “depositing” a polymer “in a manner involving more than just adsorption on the surface of the substrate.”

One of ordinary skill in the art would thus understand from the specification that the term “depositing” recited in the appealed claims relates to the build up of a coating layer through controlled precipitation. The only disclosure in Bugnon relating to “depositing” or precipitation of a polymer onto the surface of a pigment particle to form a coating relates to the use of a precipitant salt. Bugnon, p. 3, ll. 10-12. Nothing in Bugnon teaches that precipitation can result from a solvolysis reaction. In contrast, Bugnon teaches to present the polymer in a dissolved state prior to precipitation, even if it is created in situ by hydrolysis in a dispersion of the pigment. Accordingly, the disclosure of the use of a precipitant salt cannot anticipate the invention recited in the appealed claims.

Further, by teaching that the polymer coating is formed by adsorption, rather than solvolysis-induced deposition, Bugnon teaches away from the invention recited in the appealed claims. Following the teaching of Bugnon, one of ordinary skill in the art following the teaching of Bugnon would be motivated to carry out the hydrolysis reaction under solvent, concentration and/or temperature conditions appropriate to induce adsorption. In so doing, one of ordinary skill in the art would be lead away from the invention recited in the appealed claims because the artisan would choose conditions that were not appropriate for inducing deposition in a manner involving more than just adsorption in accordance with the invention recited by the appealed claims.

The method recited in the appealed claims has a number of advantages over the adsorption and salt induced precipitation methods taught by Bugnon. First, multiple layers of polymer can be built up on a substrate surface in a controlled manner following the method recited in the appealed claims. *See* English specification at, *e.g.*, p. 2, ll. 25-31; p. 4, ll. 33-36. A coating consisting of multiple layers is not possible via mere adsorption that relies on available surface energy because, once the available bonding sites on the surface are used up, the adsorption mechanism becomes inoperative and no further layers can be formed via adsorption. Second, because according to claim 1 the less soluble form of polymer is “thereby” deposited onto the substrate in a finely controlled manner, uncontrolled precipitation or flocculation of precipitant randomly in the solution does not occur, as would happen if precipitant salt were added to the solution. Hence, the remainder of the polymer that is not converted to a less soluble form and thereby deposited onto the substrate form remains stabilized in the solution thus counteracting flocculation. *See* English specification, p. 4, ll. 1-15, 32-35; p. 5, l. 31, to. p. 6, l. 8; p. 6, ll. 19-23.

Accordingly, Appellants respectfully submit that claim 1 is not anticipated nor rendered obvious by Bugnon and the rejection under 35 U.S.C. § 102(b) is improper.

C. Rejection of Independent Claim 1 and Dependent Claims 3, 4, 5, 7, 8, 10, 12, 14, and 16 under § 103(a) as Obvious over Bugnon in view of Noro

Noro fails to cure the deficiencies of Bugnon discussed above. Noro is generally directed to solvolysis reactions for converting polyvinylacetate (PVAc) to polyvinyl alcohol (PVOH). Noro is directed to solvolysis of PVAc and teaches that PVAc may be converted to PVOH and precipitated from a solution by a solvolysis reaction, such a reaction results in pure, flocculated polyvinyl alcohol particles. Nothing in Noro teaches or suggests that a solvolysis reaction can be used in connection with a process for coating a substrate. In particular, nothing in Noro teaches that the kinetically controlled reaction can be used to deposit PVOH onto the surface of a substrate or how this depositing could occur in the controlled manner according to claim 1, especially “in a manner involving more than just adsorption,” let alone that deposition or precipitation under kinetic control of a solvolysis reaction will give rise to an improved coating as compared to precipitation using a precipitant salt.

Thus given the disclosures of Bugnon and Noro, one of ordinary skill in the art would not be able to arrive at the invention recited in the appealed claims because, as discussed above, Bugnon teaches away from the invention recited in the appealed claims. Bugnon teaches that substrates are to be coated by either precipitating a polymer with a precipitate salt, or by adsorption of a polymer from solution, both of which are distinctly different processes from that recited by the appealed claims. Thus one of ordinary skill in the art would not be motivated to use the solvolysis reaction for a kinetically controlled precipitation, following the teaching of Noro, so as to form a coated substrate having a controlled coating thickness formed as a result of the in situ solvolysis-induced precipitation of a polymer.

Accordingly, Appellants respectfully submit claim 1 is not rendered obvious by Bugnon alone or in combination with Noro, and the rejection under 35 U.S.C. § 103(a) is improper.

D. Rejection of Independent Claim 17 under § 103(a) over Bugnon in view of Noro and Stamicarbon

Independent claim 17 is the same as claim 1, but additionally recites that the solvolysis reaction is “kinetically controlled.” Kinetic control is the mechanism by which the

less soluble form of polymer is “thereby” deposited onto the surface of the substrate in a finely controlled manner. In contrast to mere adsorption which is limited to formation of a single layer, or uncontrolled precipitation which results in wasteful polymer flocculation, single or multiple layers of the polymer having a controlled coverage, density and thickness can be built up on the substrate by kinetically controlling the reaction.

As discussed above, Bugnon alone or in combination with Noro fails to teach or suggest the method of coating the surface of substrates recited in the appealed claim 1. While Noro generally discusses kinetically-controlled solvolysis of PVAc to PVOH, nothing in Noro teaches or suggests that such a kinetically-controlled solvolysis reaction could be used in connection with a process for coating a substrate. Bugnon teaches away from the invention recited in the appealed claims because, as discussed above, Bugnon teaches that coating should result from precipitant salt-induced precipitation or from adsorption.

Stamicarbon fails to cure the deficiencies of Bugnon and Noro. Stamicarbon discloses the preparation of a polyvinyl alcohol by alkali-catalysed solvolysis of PVAc wherein the PVOH has a narrow range of solvolysis. Nothing in Stamicarbon teaches or suggests that a solvolysis reaction can be used in connection with a process for coating a substrate. In particular, nothing in Stamicarbon teaches that the kinetically-controlled reaction can be used to deposit PVOH onto the surface of a substrate or how this depositing could occur in the controlled manner according to claim 17, especially “in a manner involving more than just adsorption.”

Accordingly, Appellants respectfully submit that independent claim 17 is not rendered obvious by the disclosures of Bugnon, Noro, or Stamicarbon, taken alone or in combination, and that the rejection of claim 18 under 35 U.S.C. § 103(a) is improper.

E. Rejection of Independent Claim 18 and Claim 19 dependent thereon under § 103(a) over Bugnon in view of Noro and Stamicarbon.

As discussed above, Bugnon alone or in combination with Noro and/or Stamicarbon fails to teach or suggest the method of coating the surface of substrates recited in the appealed claims 1 and 17. Independent claim 18 is the same as claim 17, but recites that at least a portion of the polymer is converted to an insoluble form that is deposited on the surface of a substrate. Claim 18 thus further distinguishes Bugnon in which coating of the substrate by adsorption of a polymer may occur wholly apart from the conversion of a soluble polymer form to an insoluble form via solvolysis reaction. Claim 18 also distinguishes Bugnon in which the coating may occur by precipitation of large amounts of flocculated polymer.

For all the foregoing reasons, Appellants respectfully submit that independent claim 18, as well as claim 19 dependent thereon, is not rendered obvious by the disclosures of Bugnon, Noro, or Stamicarbon, taken alone or in combination, and that the rejection of claims 18 and 19 under 35 U.S.C. § 103(a) is improper.

F. Rejection of Independent Claim 20 under § 103(a) over Bugnon in view of Noro and Stamicarbon.

As discussed above, Bugnon alone or in combination with Noro and/or Stamicarbon fails to teach or suggest the method of coating the surface of substrates recited in the appealed claims 1, 17 and 18. Independent claim 20 is the same as claim 1, but additionally recites that the deposition of the polymer resulting from the solvolysis reaction yields a coating of a controlled thickness. Claim 20 thus further distinguishes Bugnon which teaches coating a substrate only by adsorption or by uncontrolled precipitation using a precipitant salt. Nothing in Bugnon teaches a method of controlling the solvolysis reaction so as to achieve a coating having a controlled thickness.

For all the foregoing reasons, Appellants respectfully submit that independent claim 20 is not rendered obvious by the disclosures of Bugnon, Noro, or Stamicarbon, taken alone or in combination, and that the rejection of claim 20 under 35 U.S.C. § 103(a) is improper.

G. Rejection of Claim 2 under § 103(a) over Bugnon in view of Marie, or in view of Marie and Noro

Marie fails to cure the deficiencies of Bugnon discussed above as to claim 1 and as to claim 2, which further recites that the solvolysis reaction is carried out only partially.

Marie is generally directed to controlled basic solvolysis of ethylene-vinyl acetate copolymers (EVA) to ethylene-vinyl alcohol copolymers (EVOH). Nothing in Marie teaches or suggests that a solvolysis reaction can be used in connection with a process for coating a substrate. In particular, nothing in Marie teaches that a solvolysis reaction can be used to deposit PVOH onto the surface of a substrate or that this depositing could occur in the controlled manner according to claim 1, especially “in a manner involving more than just adsorption.”

Given the disclosures of Bugnon and Marie, one of ordinary skill in the art would not be able to arrive at the invention recited in the appealed claims because Bugnon teaches away from the invention recited in the appealed claims. As discussed above, Bugnon teaches that substrates are to be coated by either precipitating with a salt, or by adsorption. Thus one of

ordinary skill in the art would not be motivated to carry out the solvolysis reaction in a kinetically controlled fashion, following the teaching of Marie, such that a controlled substrate coating is formed as a direct result of the in situ precipitation of polymer.

The addition of the disclosure of Noro still fails to render the invention recited in dependent claim 2 obvious. As discussed above, one of ordinary skill in the art would not be able to arrive at the invention recited in the appealed claims because Bugnon teaches away from the invention recited in the appealed claims. As discussed above, Bugnon teaches that substrates are to be coated by either precipitating with a salt, or by adsorption. Thus one of ordinary skill in the art would not be motivated to carry out the solvolysis reaction in a kinetically controlled fashion in a solvent being a non-solvent for the reaction product, following the teaching of Noro and/or Marie, such that a controlled substrate coating is formed as a direct result of the in situ precipitation of polymer.

For all the foregoing reasons, Appellants respectfully submit that neither claim 1 nor dependent claim 2 is rendered obvious by the disclosures of Bugnon, Marie, and Noro, taken alone or in combination, and that the rejections of claim 2 under 35 U.S.C. § 103(a) are improper.

H. Rejection of claim 6 under § 103(a) over Bugnon in view of Mark, or in view of Noro and Mark

Mark fails to cure the deficiencies of Bugnon discussed above as to claim 1 and as to claim 6 dependent thereon through claim 5, which further recites that the process includes immobilizing the polymer on the surface of the substrate by means of a crosslinking reaction (either a free-radical reaction or an addition or condensation reaction as recited in claim 6) following the solvolysis reaction.

Mark contains a general discussion of addition or condensation polymerization reactions. Nothing in Mark is directed in any way to solvolysis reactions or to processes for coating substrates. In addition, nothing in Mark teaches or suggests that addition or condensation reactions can be used to crosslink polymers, or in particular to crosslink polymers that have been deposited onto the surface of a substrate so as to immobilize such polymers on the substrate surface.

Noro fails to cure the deficiencies of Bugnon and Mark. As discussed above, Noro is generally directed to solvolysis reactions for converting polyvinylacetate (PVAc) to polyvinyl alcohol (PVOH). Nothing in Noro teaches or suggests that a solvolysis reaction can be used

in connection with a process for coating a substrate. In particular, nothing in Noro teaches that the kinetically controlled reaction can be used to deposit PVOH onto the surface of a substrate or that this depositing could occur in the controlled manner according to claim 1, especially “in a manner involving more than just adsorption.” Moreover, nothing in Noro teaches or suggests that addition or condensation reactions can be used to crosslink polymers, or in particular to crosslink polymers that have been deposited onto the surface of a substrate so as to immobilize such polymers on the substrate surface.

Given the disclosures of Bugnon, Mark and Noro, one of ordinary skill in the art would not be able to arrive at the invention recited in the appealed claims because, as discussed above, Bugnon teaches away from the invention recited in the appealed claims.

For all the foregoing reasons, Appellants respectfully submit that neither claim 1 nor dependent claim 6 is rendered obvious by the disclosures of Bugnon, Mark, and Noro, taken alone or in combination, and that the rejections of claim 6 under 35 U.S.C. § 103(a) are improper.

I. Rejection of claims 9 and 15 under § 103(a) over Bugnon in view of Cox, or in view of Noro and Cox

Cox fails to cure the deficiencies of Bugnon discussed above as to claim 1 and as to claims 9 and 15 dependent thereon, which recite that the substrate is flat (claim 9) or metallic and made of steel, galvanized steel, aluminum or aluminum alloy (claim 15).

Cox discloses a method of coating substrates (e.g., aluminum flakes) by (i) dispersing the substrates in a liquid solution of a block or graft copolymer having a first and second component and (ii) changing the polarity of the liquid so as to cause at least one component of the copolymer to precipitate out of the liquid and onto the substrate while the second component remains solvated by the liquid so as to prevent the substrates from flocculating. Nothing in Cox et al. teaches or suggests that the copolymer undergoes a bond breaking reaction as a result of the change in solvent polarity. Contrastingly, Cox et al. discloses that when the first component precipitates onto the substrate (e.g., a solid particle), the second component “remains in solution, or more correctly, remains solvated by the liquid” (*see, e.g.*, col. 1, lines 51-56) and that by remaining in solution, the second component acts to “enhance the stability of the particles in the dispersion” thereby preventing flocculation (*see, e.g.*, col. 1, lines 56-72). The presence of the second copolymer component covalently bound to the first copolymer component precipitated on the substrate particle surface, but solvated by the

liquid, prevents two or more substrate particles from flocculating by acting as a physical barrier to contact between adjacent substrate particles in the liquid.

There is no teaching in Cox et al. other than a simple physical deposition of a portion of the block or graft copolymer on the substrate surface. The deposition is caused by modifying the solvent polarity such that a first component of the copolymer chain becomes insoluble in the solvent and physically adheres to the substrate surface while a second component of the copolymer chain remains solvated by the liquid and thus continues to interact with the liquid or solvent environment rather than the substrate surface. The second component of the copolymer chain thus sticks out from the surface of the substrate and is surrounded by solvent molecules (*i.e.*, is solvated) which helps to stabilize the coated particles in the dispersion. The process in Cox et al. does not involve breakage or formation of chemical bonds as is required by a solvolysis reaction as recited in the appealed claims.

Noro fails to cure the deficiencies of Bugnon and Cox. As discussed above, Noro fails to teach or suggest that a solvolysis reaction can be used in connection with a process for coating a substrate. Moreover, nothing in Noro teaches or suggests that addition or condensation reactions can be used to crosslink polymers, or in particular to crosslink polymers that have been deposited onto the surface of a substrate so as to immobilize such polymers on the substrate surface.

Given the disclosures of Bugnon, Cox and Noro, one of ordinary skill in the art would not be able to arrive at the invention recited in the appealed claims because, as discussed above, Bugnon teaches away from the invention recited in the appealed claims.

For all the foregoing reasons, Appellants respectfully submit that neither claim 9 nor claim 15 is rendered obvious by the disclosures of Bugnon, Cox, and Noro, taken alone or in combination, and that the rejections of claims 9 and 15 under 35 U.S.C. § 103(a) are improper.

J. Rejection of Claims 11 and 13 under § 103(a) over Bugnon in view of Herman, or over Bugnon in view of Noro and Herman

Claim 13 has been canceled and so the rejections of this claim are moot.

Herman fails to cure the deficiencies of Bugnon discussed above as to claim 1 and as to claim 11 dependent thereon, which recites that the method further comprises coating the surface of the substrate with a nanolayer of the polymer.

Herman is generally directed to a process for coating pigment particles by adsorbing an anchoring agent onto the particles and then dispersing the particles in a solution of vinyl monomers capable of undergoing copolymerization with the anchoring agent. Herman teaches that coated particles formed by such process did not agglomerate and gave mean particle diameters of 0.25 to 0.26 microns before and after coating, which the Examiner has interpreted to mean that the coating has nanolayer thickness. Nothing in Herman teaches or suggests that a solvolysis reaction can be used in connection with a process for coating a substrate. In particular, nothing in Herman teaches that a solvolysis reaction can be used to deposit a polymer such as PVOH onto the surface of a substrate in a controlled manner according to claim 1, especially "in a manner involving more than just adsorption." Significantly nothing in Herman teaches or suggests that a coating prepared by the process recited in the appealed claims could result in a nanolayer coating as recited by claim 11.

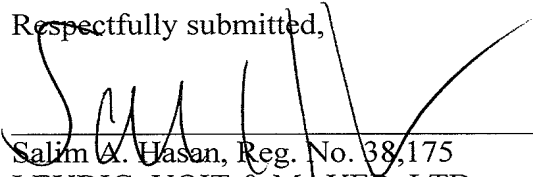
Noro fails to cure the deficiencies of Bugnon and Herman. As discussed above, Noro fails to teach or suggest that a solvolysis reaction can be used in connection with a process for coating a substrate. Thus given the disclosures of Bugnon, Herman and Noro, one of ordinary skill in the art would not be able to arrive at the invention recited in the appealed claims because, as discussed above, Bugnon teaches away from the invention recited in the appealed claims.

For all the foregoing reasons, Appellants respectfully submit that claim 11 is not rendered obvious by the disclosures of Bugnon, Herman, and Noro, taken alone or in combination, and that the rejections of claim 11 under 35 U.S.C. § 103(a) are improper.

Conclusion

For the foregoing reasons, Appellants respectfully request the reversal of the rejections of the subject patent application.

Respectfully submitted,



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Claim Appendix

1. A method of coating the surface of substrates, comprising the steps of:
bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and
converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a solvolysis reaction; and
thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the surface of the substrate.
2. The method as claimed in claim 1, wherein the solvolysis reaction is carried out only partially.
3. The method as claimed in claim 1, wherein the polymer has side chains or a backbone chain comprising unsaturated groups.
4. The method as claimed in claim 1, wherein the polymer exhibits active groups and/or forms the same during the solvolysis reaction, which groups serve to immobilize the polymer.
5. The method as claimed in claim 1, further comprising the steps of coating the surface of the substrate with the polymer and immobilizing the polymer, by means of a crosslinking reaction following the solvolysis reaction.
6. The method as claimed in claim 5, wherein the crosslinking reaction is a free-radical reaction or an addition or condensation reaction.
7. The method as claimed in claim 4, further comprising the step of washing the surface of the substrate following immobilization of the polymer.
8. The method as claimed in claim 1, wherein the substrate is a particulate substrate and that the polymer has a molar mass of from 1,000 to 50,000 g/mol.
9. The method as claimed in claim 1, wherein the substrate is a flat substrate and that the polymer has a molar mass of from 1,000 to 500,000 g/mol.

10. The method as claimed in claim 8, wherein the particulate substrate is selected from the group comprising pigments, fillers, fibers, nano particles, and particles of colloidal or micellar systems.

11. The method as claimed in claim 1, further comprising the step of coating the surface of the substrate with a nano layer of a polymer.

12. A substrate having a polymer-coated surface, produced by a method as claimed in claim 1.

13. (Canceled)

14. The method as claimed in claim 1, wherein the substrate is a metallic substrate.

15. The method as claimed in claim 14, wherein the substrate is made of steel, galvanized steel, aluminum, or an aluminum alloy.

16. The method as claimed in claim 1, wherein the substrate is a particulate substrate, selected from the group comprising pigments, fillers, fibers or lamellar particles, nano particles, and particles of colloidal or micellar systems.

17. A method of coating the surface of substrates, comprising the steps of:
bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and

converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a kinetically controlled solvolysis reaction and thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the substrate surface.

18. A method of coating the surface of substrates, comprising the steps of:
bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and

converting at least a portion of the polymer to a polymer form that is insoluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a kinetically controlled solvolysis reaction and thereby depositing the insoluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the substrate surface.

19. The method as claimed in claim 18, wherein the solvolysis reaction results in substantially all the insoluble polymer form being deposited on the surface of the substrate.

20. A method of coating the surface of substrates, comprising the steps of:
bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and

converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a solvolysis reaction and thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the surface of the substrate,

wherein the deposition of the less soluble polymer on the substrate surface yields a coating on the substrate having a controlled thickness.

Evidence Appendix

Not applicable.

Related Proceedings Appendix

Not applicable.